IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

THETA IP, LLC., Plaintiff, v. SAMSUNG ELECTRONICS CO., LTD., and SAMSUNG ELECTRONICS AMERICA, INC. Defendants.	Civil Action No.: 6:20-cv-00160 **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Theta IP LLC ("Plaintiff" or "Theta"), through its attorneys, for its Complaint against Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, "Samsung" or "Defendants), demands a trial by jury and alleges as follows:

FACTUAL INTRODUCTION

1. This case is about Samsung's infringement of ground-breaking patents directed to reducing the power consumed by the receiver in cellular phones and other types of mobile devices. Infringement of the Plaintiff's patents enables Samsung to realize significant product cost and size savings by utilizing smaller, less expensive batteries in their cellular phones and tablets without compromising performance, and while meeting consumer expectations concerning the length of time that a phone may be used before its battery requires a recharge.

2. Cell phone ownership skyrocketed in the last fifteen years as the cell phone became ubiquitous. New classes of mobile devices, along with the omnipresent cell phone, have been introduced on a yearly product cycle. Cell phones in particular have evolved from simple mobile phones to smart phones that might more aptly be called "Mobile Internet Appliances." For

simplicity, the terms cellular phone, cell phone, mobile phone, and smart phone are used interchangeably herein. Mobile devices have rapidly evolved to support a wide array of data-hungry applications that increase the demand for battery power in a market where consumers demand increased battery life along with expanded functionality. In parallel with consumer demand for increased functionality, the demand for larger screens has increased power demands. Advances in battery and screen technology alone have been inadequate to meet consumer demand for increased battery life along with expanded functionality. The ever-present need to stay online and connected imposes ever-increasing demands for a battery life that is sufficient to satiate consumer expectations. At the same time, competing consumer demands for lighter, smaller, or thinner devices place limits on commercially viable battery size and weight. From the cell phone maker's perspective, a phone's battery comprises a substantial portion of the overall bill of material cost, so any need for a larger battery increases the cost of the finished goods. In addition, a smaller battery results in slimmer design form factor, and less weight, both with substantial influence on the overall competitiveness and market success of the product. Thus, decreasing a mobile phone's power consumption to maximize battery life is an imperative goal for engineers that design mobile devices.

3. Because the cell phone receiver must always be on to receive a cellular call, the cellular phone receiver consumes a significant portion of a phone's battery life. The lower the quality of an incoming signal, the more battery power is consumed. As a user moves farther away from a cellular tower, the signal level decreases and is often further degraded by interference from physical objects or other radio signals. Noise is also introduced from a variety of sources. Within a cellular device, a series of components operate in concert to amplify the signals received from the

antenna and filter out the unwanted noise and interference. Achieving adequate performance with widely varying signal quality has always been a major challenge for cell phone makers.

4. Prior to the inventions of the Patents in Suit, cellular radio designers focused mostly on making sure the cell phone would operate in the "worst-case" scenario. The "worst-case" occurs when the desired signal strength is low, and interference and noise are high. Because conditions are not always "worst case," a cell phone designed to focus on this worst-case scenario consumes more power than is necessary for the actual operating conditions. Battery life was wasted addressing conditions that were not always present.

5. Professor Yannis Tsividis is a renowned researcher and educator, widely recognized as a pioneer in integrated circuit design, circuits for signal processing, and adaptive-power circuits. Currently a professor of electrical engineering at Columbia University in New York, he previously worked at Motorola Semiconductor and AT&T Bell Laboratories, and taught at the University of California, Berkeley, the National Technical University of Athens, the Massachusetts Institute of Technology, and the University of Paris 6. A large part of his academic and industry pursuits focused on delivering power-optimized solutions; in his words: "I have felt for a long time that, although it is necessary to dissipate power when you are doing something useful in circuits such as filters, dissipating such power when the signal does not demand it is a crime."

6. Prof. Tsividis is an IEEE Life Fellow—a distinction reserved for select IEEE members whose extraordinary accomplishments are deemed fitting of this prestigious recognition—and the recipient of numerous awards from Columbia University and the Institute of Electrical and Electronics Engineers (IEEE). The IEEE Solid State Circuits Magazine dedicated its Fall 2014 issue to recognizing Prof. Tsividis as a "Path-Breaking Researcher and Educator." In that issue, his colleague at Columbia University honored Prof. Tsividis's quest to innovate: "He is genuinely

interested in the research of others, stimulates the development of new ideas, and always strives to find the original source of ideas. But, like no other, he is able to identify new directions, even if it means going against what is considered common sense." Peter Kinget, *Guest Editorial: A Born Educator and Researcher*, IEEE SOLID STATE CIRCUITS MAG., Fall 2014, at 13. Prof. Kinget is currently the Chairman of the Electrical Engineering Department at Columbia University. Last year, the United States National Academy of Engineering elected Prof. Tsividis as a member for his contributions to analog and mixed-signal integrated circuit technology and engineering education, one of the highest professional honors awarded to an engineer.

7. Professor Tsividis co-founded Theta, along with Yannis Papananos, a Professor at the National Technical University of Athens. Prof. Tsividis maintained a position as a technical consultant throughout the life of Theta, during which time he helped the company design more power-efficient radio transceiver integrated circuits for use in the design of mobile devices of several kinds. In 2002, while working on Theta-related projects, Prof. Tsividis invented novel and path-breaking solutions that allowed for dynamic adjustment of components within the radio's signal path to optimize power consumption based upon the signal strength of the desired signal(s) and interferer signal(s), which are claimed in the Patents in Suit. His inventions allow significant reduction in power consumption relative to the worst-case scenario (in which radios were designed or are required to operate). By optimizing the power of the radio circuitry in this way, mobile device makers could achieve improved battery life, or reduce the size and weight of the battery or the device, or both—depending on the marketing or design requirements.

8. Prof. Tsividis's inventions received significant academic and industry acclaim. Indeed, the need to optimize power was critical to achieving product designs that satisfied consumers' demand for devices that were "always connected," portable, and could operate for long

periods of time without recharging. Prof. Tsividis has been frequently invited to present his research at academic and industry conferences, events, and training sessions. His inventions on dynamically controlling the power dissipation of mobile devices are now the subject of five issued United States Patents that are assigned to Theta, three which are asserted in this action.

9. As described in further detail herein, Samsung utilizes this patented technology in all its most recent cell phone models. Indeed, Samsung appears to include radios that employ these patented power-saving designs and methods across the entirety of its mobile phone and cellular-enabled tablet lineup offered in the United States. And Samsung does so knowing not only of Dr. Tsividis's inventions, but also its unlawful practice of them.

10. Samsung recognizes significant financial benefit, competitive advantage, and market positioning value from its unauthorized practice of the Theta's patented inventions. By using Dr. Tsividis's power optimization strategies, Samsung can market and sell mobile devices, including their many cell phones, that continue to function for longer periods of time between recharges, and to do so without having to increase the capacity of the battery embedded in its devices. Samsung is therefore able to offer smaller, sleeker devices than it could without using Theta's patented improvements—and enjoys significant savings in the device's bill of material and hence manufacturing costs in the process.

NATURE OF THE ACTION

11. This is an action for infringement of U.S. Patent No. 9,838,962 ("the '962 Patent"), U.S. Patent No. 10,129,825 ("the '825 Patent"), and U.S. Patent No. 10,524,202 ("the '202 Patent") (collectively, the "Patents in Suit"). The Patents in Suit are based on inventions of Yannis Tsividis.

THE PARTIES

12. Theta is a limited liability company organized under the laws of Delaware, with its principal place of business at 710 Inglenook Court, Coppell, Texas 75019.

13. Theta is the true and correct owner of the Patents in Suit and holds all rights necessary to bring this action.

14. On information and belief, Defendant Samsung Electronics Co., Ltd. is a corporation organized under the laws of the Republic of Korea, with a principal place of business at 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, South Korea.

15. On information and belief, Defendant Samsung Electronics America, Inc. is a wholly owned subsidiary of Samsung Electronics Co., Ltd. and a limited liability company organized under the laws of New York, with a principal place of business at 85 Challenger Road, Ridgefield Park, New Jersey 07660.

16. Joinder is proper under 35 U.S.C. § 299. The allegations of infringement contained herein are asserted against the Defendants jointly, severally, or in the alternative and arise, at least in part, out of the same series of transactions or occurrences relating to Defendants' manufacture, use, sale, offer for sale, and importation of the same accused products. On information and belief, Defendants are part of the same corporate family of companies, and the infringement allegations arise at least in part from Defendants' collective activities with respect to Defendants' accused products. Questions of fact common to Defendants will arise in the action, including questions relating to the structure and operation of the accused products and Defendants' infringing acts.

JURISDICTION AND VENUE

17. This action arises under the patent laws of the United States, Title 35 of the United States Code. Subject matter jurisdiction is proper in this Court pursuant to 28 U.S.C. §§ 1331 and 1338(a).

18. Venue is proper in this District under 28 U.S.C. §§ 1391(c) and 1400(b).

19. Samsung is subject to this Court's specific and general personal jurisdiction pursuant to due process and/or the Texas Long Arm Statute, due at least to its substantial business in this forum, including: (i) at least a portion of the infringements alleged herein; and (ii) regularly doing or soliciting business, engaging in other persistent courses of conduct, and/or deriving substantial revenue from goods and services provided to individuals in Texas and in this District.

20. Samsung has transacted business in this district and has committed acts of patent infringement in this District. Additionally, Samsung maintains a substantial physical presence in Texas and within this District.

21. Defendant Samsung Electronics America, Inc. has a registered agent for service of process named CT Corporation System that has an address listed in Texas at 1999 Bryan St., Ste. 900, Dallas, TX 75201.

22. Defendant Samsung Electronics America, Inc. has substantial undertakings in this District, including those of predecessor-in-interest Samsung Telecommunications America, LLC. Previously, Samsung Telecommunications America, LLC, another wholly owned subsidiary Samsung Electronics Co., Ltd., maintained its principal place of business at 1301 East Lookout Drive, Richardson, Texas 75082. On information and belief, Samsung Telecommunications America, LLC merged with Defendant Samsung Electronics America, Inc. effective January 1, 2015.

23. Samsung maintains several offices within this District. For example, Samsung maintains substantial physical locations at 12100 Samsung Blvd., Austin, TX, and 3900 N. Capital of Texas Hwy, Austin, TX. On information and belief, Samsung has over 3,000 employees and at least 2.45 million square feet of floor space within this District.

24. Samsung also owns and operates an online store, through which it sells substantial volumes of products, including infringing products, in Texas and within this District. Through its online presence, and through numerous distributors and resellers (both online and brick-and-mortar), Samsung directly and indirectly extracts significant revenues from Texas and this District.

25. Samsung has committed tortious acts within Texas and this District, and the causes of action set forth in this Complaint arise from those acts. Samsung develops, manufactures, distributes, and sells mobile telephone and computing products that infringe the Patents in Suit, which are, and have been, offered for sale, sold (directly or through Defendants' online store and distribution network), purchased, and used in Texas and within this District. Defendants, directly or through their distribution network, also place infringing products within the stream of commerce, with the knowledge and/or understanding that such infringing products will be sold and/or used in Texas and in this District.

FACTUAL ALLEGATIONS

The Patented Inventions

26. Prof. Yannis Tsividis is a founder, consultant and shareholder of Theta; he invented the improvements that are described and claimed in the '992, '825, and '202 Patents while working on projects for Theta. At the time, Theta was developing high performance wireless networking equipment for mobile devices. The Patents in Suit describe and claim systems and methods for reducing power dissipation in the receivers of battery powered mobile devices by varying the

operational characteristics of components in the receiver signal path based upon the operating conditions in accordance with the claims.

27. Prof. Tsividis is a pioneer in the integrated circuits and systems field and is widely recognized for his contributions to the advancement of electrical engineering. Prof. Tsividis is the Edwin Howard Professor of Electrical Engineering at Columbia University. In addition to his selection as a Life Fellow of the IEEE, he received numerous awards and distinctions throughout his career, including the Golden Jubilee Medal from the IEEE Circuits and Systems Society in 2000, the IEEE Undergraduate Teaching Award in 2005, and the IEEE Gustav Robert Kirchhoff Award in 2007. Prof. Tsividis is the recipient of the 1984 IEEE W.R.G. Baker Prize Award for the best IEEE publication, the 1986 European Solid-State Circuits Conference Best Paper Award, and the 1998 and 2008 IEEE Circuits and Systems Society Guillemin-Cauer Best Paper Awards. He is also the co-recipient of the 1987 IEEE Circuits and Systems Society Darlington Best Paper Award and the 2003 IEEE International Solid-State Circuits Conference L. Winner Outstanding Paper Award. In 2019, Prof. Tsividis was elected a member of the National Academy of Engineering (NAE), one of the highest professional honors awarded to an engineer, citing his "contributions to analog and mixed-signal integrated circuit technology and engineering education." *See* https://www.nae.edu/204145/Professor-Yannis-Tsividis.

28. Prof. Tsividis continues to receive recognition for the detailed teachings described and claimed in the Patents in Suit. By way of example, the IEEE Solid-State Circuits Magazine recently featured Prof. Tsividis and his explanation of related subject matter in its Fall 2018 issue, based on a presentation given at the Forum on Energy Efficient Analog Design, IEEE Solid-State Circuits Conference 2018. *See* Yannis Tsividis, *Signal-to-Noise Ratio, Dynamic Range, and Power Dissipation*, IEEE SOLID STATE CIRCUITS MAG., Fall 2018, at 60. As discussed above, the Fall

2014 issue of the same trade publication featured Prof. Tsividis on the cover of a special edition dedicated to the recognition of his role as a "Path-Breaking Researcher and Educator." That issue featured his many contributions to solid-state circuits and systems education, MOS modeling, and analog and IC design. Indeed, the detailed teachings and the inventions claimed in the Patents in Suit (and their predecessor patents) became fundamental to radio receiver design.

29. Theta IP is the owner by assignment of each of the Patents in Suit, each of which is presumed valid and enforceable.

30. The Theta/Tsividis family of patents that includes the Patents in Suit has been cited by USPTO examiners and applicants on numerous occasions, including in patent applications filed by Samsung, Qualcomm, Broadcom, Ericsson, Intel, Texas Instruments, and others.

31. In the years leading up to the claimed inventions, wireless connectivity was gaining in popularity. Increasingly, laptops were fitted with wireless networking cards. Mobile phone adoption was also on the rise, as was prevalence of cellular data. A downside of this connectivity was a corresponding drain on battery life, especially for mobile devices; the power consumed by a wireless transmitter and receiver reduces the usefulness of a device and sends a user on a hunt to recharge—or requires a larger battery to achieve the same battery life that would be achieved absent the wireless capabilities.

32. As the patents' specifications explain, one reason why this power drain was high is that electronic circuits are typically designed to function properly under worst-case operating conditions. For a wireless transceiver (a combined receiver and transmitter), the worst-case condition occurs when the reception of the desired signal is low, while other transceivers, nearby electronic equipment, or other factors generate interfering signals and spurious noise. This worst-case condition is typically accompanied by a worst-case power consumption owing to the need for

increased amplifier gain and bias and impedance scaling to achieve and maintain adequate connectivity.

33. But a wireless transceiver does not always operate in these worst-case conditions. For example, a base station, router or access point may be nearby such that the received signal is strong. Also, there may be no interfering signals, or they may be relatively weak. In these situations, receiver bias currents can be reduced below what is necessary for the worst-case condition. If this is done appropriately, power dissipation is reduced while signal-to-noise ratio is appropriately managed, and battery life is increased. Contrary to designing to, and always operating for, the "worst case," the Patents in Suit describe and claim circuits and methods that adapt to a better-than-worst-case condition, thus reducing circuit currents and therefore power dissipation and battery drain accordingly.

34. Prof. Tsividis's inventions use bias current control, varying impedance, gain, and other dynamic changes (separately or in combination) to reduce power dissipation when conditions are better than a worst case. Bias currents are reduced in response to a need for reduced signal handling capability, impedances are varied/controlled thus reducing required drive and other bias currents in response to a strong received signal, or varying gain and/or impedances in response to a received signal in the presence of no or weak interfering signals.

35. The Patents in Suit claim various implementations of Prof. Tsividis's inventions. By way of example, the Patents in Suit teach that circuitry may be used to determine the signal strength of the desired signal and an interferer signal. That information about the desired signal and interferer signal (and their relation to a worst-case condition) is used to adjust the operating characteristics of the components in the receiver's signal path—for example, the amplifier(s), mixer(s), and/or filter(s)—relative to that worst-case condition. By varying a bias current and/or an

impedance, power dissipation is lowered relative to a worst-case condition. The specification describes that operating parameters, including bias current, impedance, and gain, are dynamically changed, either separately or in combination, to reduce power dissipation in response to better-than-worst case conditions.

36. The specification provides appropriate teachings to allow a person of ordinary skill in the art to practice the inventions in exemplary battery-powered mobile devices. Detailed figures and narrative descriptions explain the roles of the dynamic range and noise floors for particular operating conditions, and the effects that changes to biasing, gain, and impedances (as examples) will have on the operating characteristics of a receiver, as well as their attendant impact on power consumption. Indeed, the claims and specification provide appropriate direction to allow an ordinally skilled artisan to implement the claimed inventions without extensive experimentation.

37. An essential aspect of effective power management includes understanding when, how, and where energy is used in a device—in other words, how much energy does each component (or sub-system) consume, and under what circumstances. For example, a typical mobile phone is most often in a standby mode, where it is not in active use but must maintain contact with cellular towers so that it is prepared to receive an incoming call. In this state, the cellular radio subsystem (and its transceiver in particular) is most pronounced in its relative power consumption as compared with other components (e.g., the application processor, graphics, LCD, RAM, etc., none of which is in active use). While the phone is in active use, other subsystems may then consume more energy, but the cellular components continue to demand a significant share of the phone's available battery power. Optimizing power consumption of the phone's cellular receiver, therefore, offers a significant improvement in a mobile device's power consumption and attendant battery life across a wide array of usage scenarios.

38. The inventions described and claimed in the Patents in Suit provide important advances in mobile wireless communications, by offering novel solutions that allow for significant reduction in the power consumed by wireless receivers by responding to the conditions experienced by the device. By determining the signal levels of desired and interferer signals, it is possible to tune the operational characteristics of the components within a receiver's signal path to optimize the receiver's power consumption—with an attendant improvement to battery life.

The Patents in Suit

39. Theta is the assignee and owner of all right to enforce U.S. Patent No. 9,838,962, entitled "Power Dissipation Reduction in Wireless Transceivers," and has full rights to sue and recover damages from all past, present and future infringements of the '962 Patent. The United States Patent and Trademark Office duly and legally issued the '962 Patent on December 5, 2017. Yannis Tsividis is the sole inventor of the inventions claimed in the '962 Patent. A true and correct copy of the '962 Patent is attached as **Exhibit A**.

40. On or about December 31, 2019, the USPTO duly and legally issued a Certificate of Correction for the '962 Patent. The error in the issued patent and the manner of correcting it as identified in the Certificate would have been clearly and readily apparent to a person of ordinary skill in the art based on the disclosures in Patent itself.

41. The '962 Patent describes and claims methods for improving battery life in a wireless device by reducing the receiver's power dissipation by varying the impedance and bias current of one or more components in the receiver signal path based upon the signal strengths of the interferer and desired signals. The '962 Patent describes four exemplary signal conditions and associated adjustments to achieve a reduction in current drain when compared to a situation in

which the desired signal strength is low and the interferer signal strength is high (i.e., a representative "worst-case" condition).

42. Theta is the assignee and owner of all right to enforce U.S. Patent No. 10,129,825, entitled "Power Dissipation Reduction in Wireless Transceivers," and has full rights to sue and recover damages from all past, present and future infringements of the '825 Patent. The United States Patent and Trademark Office duly and legally issued the'825 Patent on November 13, 2018. Yannis Tsividis is the sole inventor of the inventions claimed in the '825 Patent. A true and correct copy of the '825 Patent is attached as **Exhibit B**.

43. The '825 Patent describes and claims methods for improving battery life in a wireless device by reducing the receiver's power dissipation by dynamically changing the bias current, impedance, and/or gain of one or more components in the receiver signal when operating conditions are better than a worst-case power dissipation condition (i.e., when the signal strength of the desired signal is low and the signal strength of the interferer signal is high). The '825 Patent describes various operating scenarios and associated adjustments in bias current, impedance, and/or gain to reduce power dissipation and save power.

44. Theta is the assignee and owner of all right to enforce U.S. Patent No. 10,524,202, entitled "Power Dissipation Reduction in Wireless Transceivers," and has full rights to sue and recover damages from all past, present and future infringements of the '202 Patent. The United States Patent and Trademark Office duly and legally issued the '202 Patent on December 31, 2019. Yannis Tsividis is the sole inventor of the inventions claimed in the '202 Patent. A true and correct copy of the '202 Patent is attached as **Exhibit C**.

45. The '202 Patent describes and claims methods for reducing power dissipation in wireless transceivers for operating conditions that vary between best-case and worst-case scenarios.

The signal strengths of the desired and interferer signals are determined and compared. In response to the comparison, the gain, impedance, and/or bias current of one or more components in the receiver signal path is dynamically adjusted to reduce power consumption from the battery. The '202 Patent additionally describes and claims dynamically adjusting operating parameters based on changes in interferer or desired signal strength.

46. The Patents in Suit each claim priority to two Provisional U.S. Patent Applications filed on March 31, 2003 bearing Application Nos. 60/451,229 and 60/451,230. The disclosures in these Provisional Applications fully support the disclosures and claims of the Patents in Suit.

47. The inventions taught and claimed in the Patents in Suit solved the problems described in their specifications and in this Complaint in unconventional ways that improved the functioning and performance of systems and methods of operating wireless receivers to reduce power consumption and improve battery life as compared to traditional approaches.

Samsung's Infringing Products

48. Samsung is the world's largest smartphone company, shipping more units per quarter than any other company. In addition to mobile phones, Samsung also offers an array of tablet devices that are also equipped with cellular communications capabilities. On information and belief, subject to discovery, such capabilities may also be included in laptop and hybrid tablet/computing devices.

49. Because battery life is so important, as part of its marketing efforts, Samsung frequently touts the battery life of its mobile products. Samsung advertises, for example, typical usage times before recharging is necessary based on several consumer usage scenarios (e.g., cellular calling, cellular data, without wireless capabilities, etc.). Indeed, Samsung understands and appreciates that offering products that can deliver superior battery life is instrumental to the success

of its products. Additionally, Samsung frequently refreshes its product lines to offer additional features and improved functionality over the prior generation.

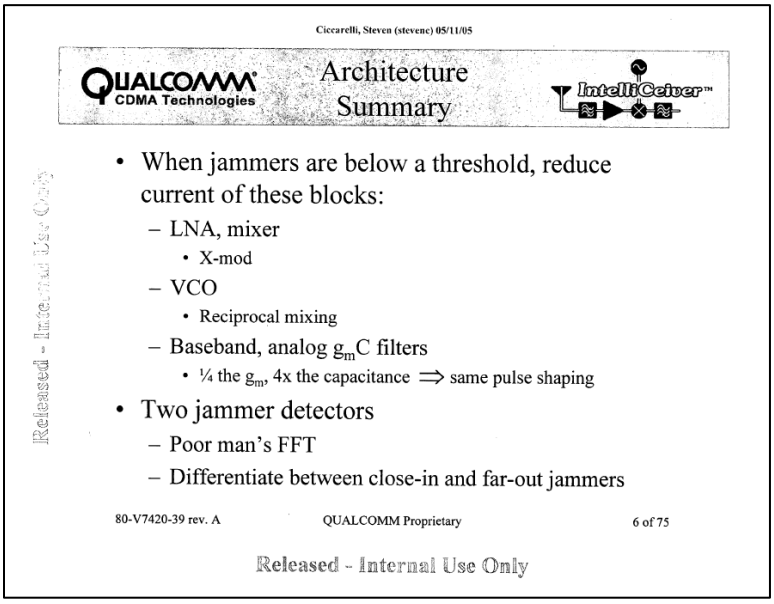
50. Samsung has offered (and currently offers) a variety of portable wireless devices in the United States. To enable cellular communications, each Accused Product includes mobile platform components from Qualcomm, including a wireless transceiver. On information and belief, all the Samsung products that include cellular capabilities that are sold or offered for sale in the United States include such platforms.

51. On information and belief, including based on a reasonable investigation of publicly available information and industry practice, each of the transceivers in the Accused Products incorporate power saving technology referred to by Qualcomm as "IntelliCeiver" technology.

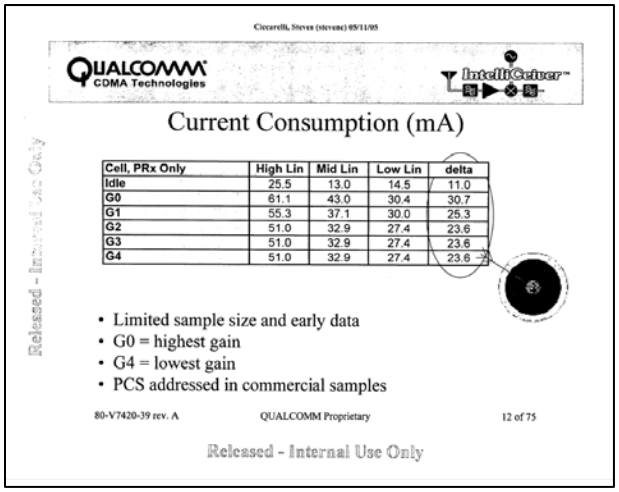
52. Qualcomm first announced an integrated transceiver with IntelliCeiver technology, the RTR6500, more than two years after the priority dates of the Patents in Suit. Qualcomm touted the benefits of "IntelliCeiver™ technology for dynamic power optimization, reducing overall power consumption to increase overall talk and standby time." According to Qualcomm's April 2006 press release, the "IntelliCeiver feature monitors the signal environment and continuously provides power optimization by reducing the IC power consumption when higher power is not needed. The power savings translate into increased talk time and enhanced overall battery life." *See* https://www.qualcomm.com/news/releases/2006/04/05/qualcomm-announces-industrys-first-single-chip-rf-cmos-transceiver. The so-called IntelliCeiver technology was included as part of the integrated cellular transceiver and has a signal path comprising a plurality of circuits, including an amplifier, a filter, and a mixer (or down converter).

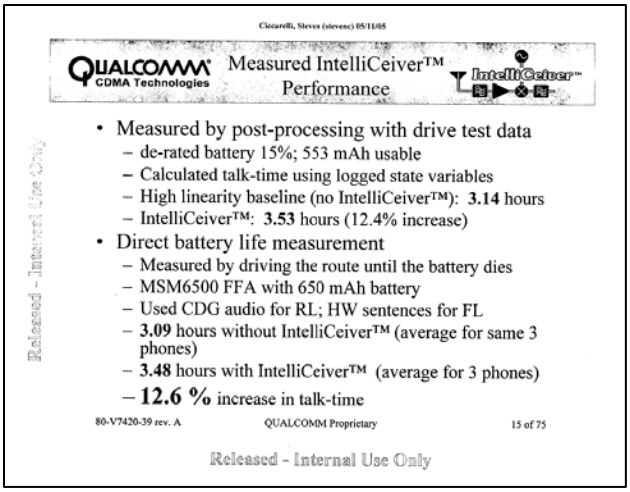
53. In its efforts to secure its own patents on IntelliCeiver technology, Qualcomm submitted copies of internal technical documents that provided additional detail concerning the

architecture, operation, and performance of the IntelliCeiver technology. These "IntelliCeiver Data Review" documents were attached to Provisional Application No. 60/800,484 filed on May 15, 2006. The IntelliCeiver Data Review attachments document operation consistent with the inventions claimed in the Patents in Suit. By way of example, the IntelliCeiver technology determines interferer levels in a received signal and adjusts the current consumption of components within the receiver signal path, including the amplifiers, filters, and mixers based on the operational characteristic encountered by the receiver.



54. The IntelliCeiver Data Review further explains that such adjustments are made for the purpose of lowering current consumption relative to a worst-case power consumption scenario. It also outlines the reduction in current consumption attributable to the use of methods to adjust the gain and/or impedance of the receiver's components in response to the determined signal levels.





55. After the initial public announcement of IntelliCeiver, the inclusion of such technology became standard Qualcomm's cellular transceiver products, as is a common industry practice. On information and belief, current-day transceiver offerings continue to include the so-called IntelliCeiver technology even if no longer actively advertised as such. By way of example, Qualcomm's documentation, roadmaps, and press releases describe and depict receivers as descending from one another.

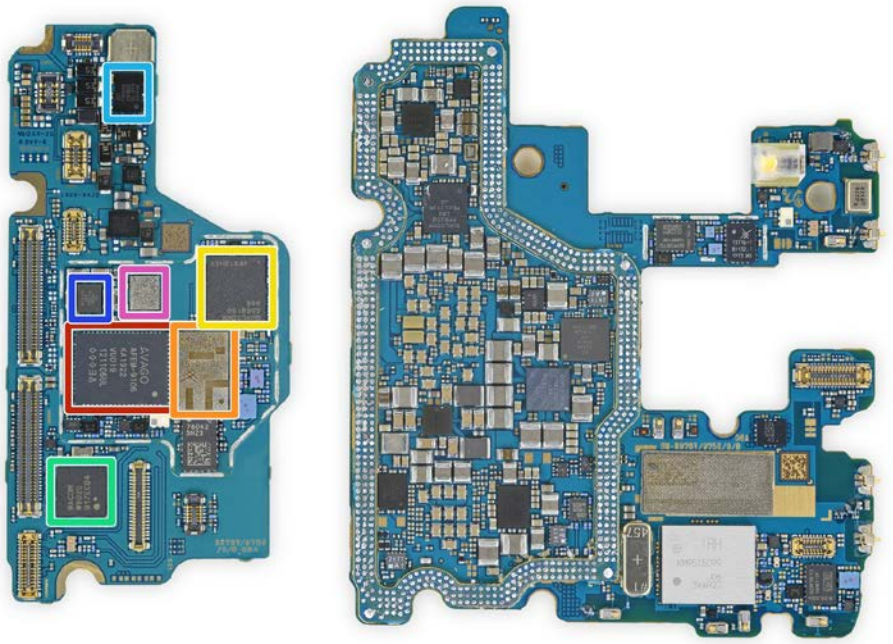
56. Information concerning the structure and operations of the transceivers included in the Samsung Accused Products is also provided in various Qualcomm technical documents, certain of which have been released on the Internet. By way of example, the MDM6200 and MDM6600 Mobile Data Modem User Guide ("Qualcomm MDM6X00 User Guide"), previously made available on the Internet, provides exemplary information concerning the structure of the circuits included in the receiver signal path and regarding the functionality and operation of the IntelliCeiver technology.

57. Given the performance improvements reported in such Qualcomm documentation, and consistent with industry practice to carry such improvements forward into subsequent generations of products, each of the Samsung products that includes a transceiver provided by

Qualcomm includes such features and functionality, and such features and functionality are active in each Samsung Accused Product.

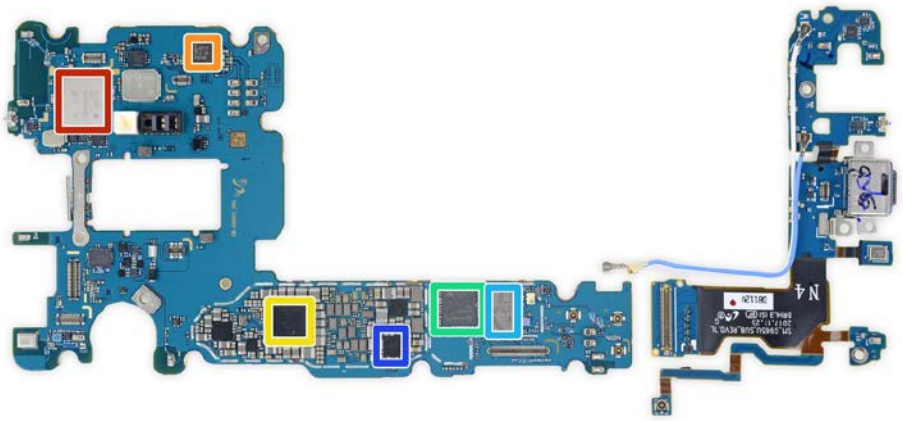
58. The Accused Products include at least the following families of products: Samsung Galaxy Epic 4G, Samsung Galaxy S III, Samsung Galaxy S4, Samsung Galaxy S5, Samsung Galaxy S6, Samsung Galaxy S7, Samsung Galaxy S8, Samsung Galaxy S9, Samsung Galaxy S10, Samsung Galaxy Note5, Samsung Galaxy Note8, Samsung Galaxy Note9, and Samsung Galaxy Note10 families.

59. Each of the Accused Products includes a Qualcomm transceiver. By way of example, the Samsung Galaxy S10 includes a Qualcomm SDR8150 transceiver, outlined below in yellow:



See https://www.ifixit.com/Teardown/Samsung+Galaxy+Note10++5G+Teardown/125590.

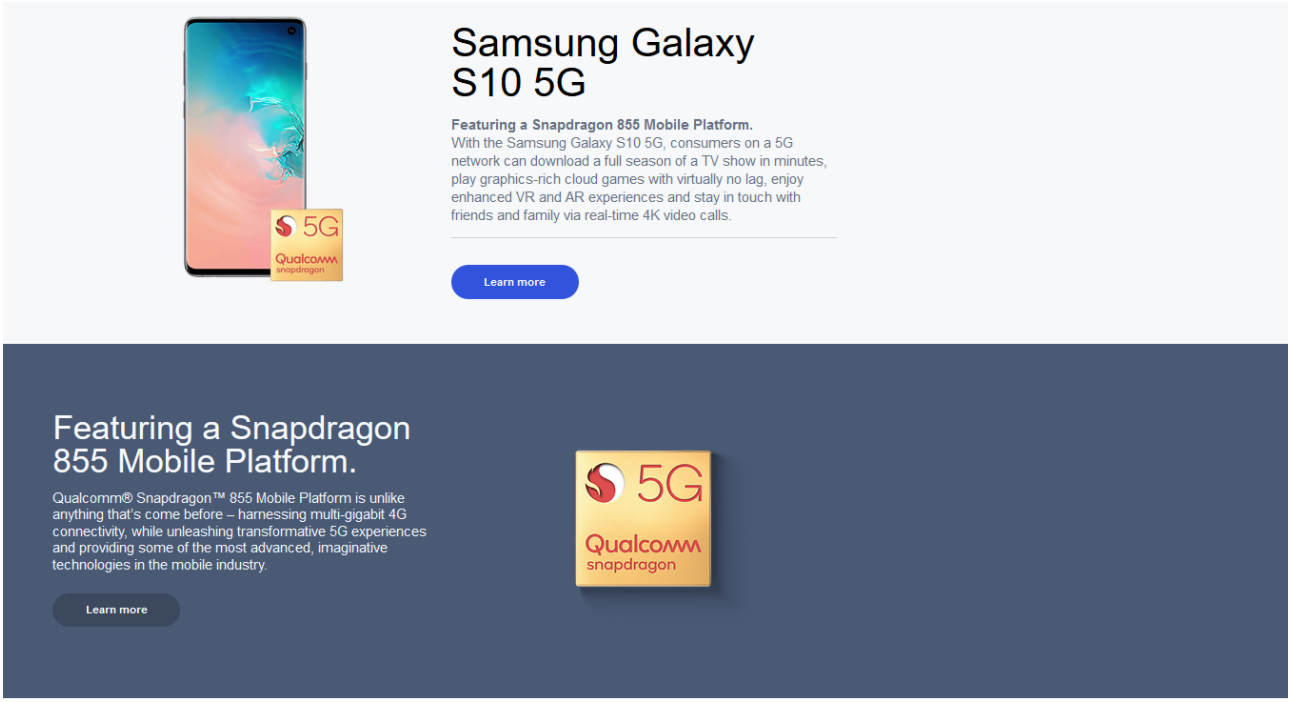
60. By way of further example, the Samsung Galaxy S9 includes a Qualcomm SDR845 transceiver, outlined below in green:



See https://www.ifixit.com/Teardown/Samsung+Galaxy+S9%2B+Teardown/104308.

61. By way of further example: the Samsung Galaxy S8 includes a Qualcomm WTR5975 transceiver; the Samsung Galaxy S7 includes a Qualcomm WTR3925 transceiver; the Samsung Galaxy S6 includes a Qualcomm WTR3925 transceiver; the Samsung Galaxy S5 includes a Qualcomm WTR1625 transceiver; the Samsung Galaxy S4 includes a Qualcomm WTR1605 transceiver; the Samsung Galaxy SIII includes a Qualcomm RTR8600 transceiver; the Samsung Galaxy Epic S4 includes a Qualcomm QSC6085 transceiver; the Samsung Galaxy Note10 includes a Qualcomm SDR8150 transceiver; the Samsung Galaxy Note9 includes a Qualcomm SDR845 transceiver; the Samsung Galaxy Note8 includes a Qualcomm WTR5975 transceiver; and the Galaxy Note5 includes a Qualcomm WRT3925 transceiver.

62. As further confirmation, Qualcomm features the recent Samsung product line on its website, identifying numerous of the ’825 Accused Products as including a Qualcomm Snapdragon mobile platform:



See https://www.qualcomm.com/snapdragon/smartphones/samsung-galaxy-s10-5g. Each of the Samsung Accused Products includes, as an element or complementary component of at least the Snapdragon mobile platform, an associated Qualcomm wireless transceiver with IntelliCeiver power savings technology.

63. To the extent that additional Samsung products incorporate or include transceivers that operate in a manner that is not colorably different from these Accused Products described herein, then such additional Samsung products are also "Accused Products."

64. To the extent that additional Samsung products include power savings functionality that operates in a manner that is not colorably different than described herein, even if delivered without the use of a Qualcomm transceiver with IntelliCeiver technology, then such additional Samsung products are also "Accused Products."

65. The Samsung Accused Products practice one or more claims of the Patents in Suit. Samsung is not authorized or licensed to practice Theta's claimed inventions, nor are any of Samsung's suppliers or vendors. As discussed in further detail below, Samsung's infringement is knowing and willful.

FIRST COUNT

(INFRINGEMENT OF U.S. PATENT NO. 9,838,962)

66. Theta incorporates by reference the allegations set forth in paragraphs 1-65 as though fully set forth herein.

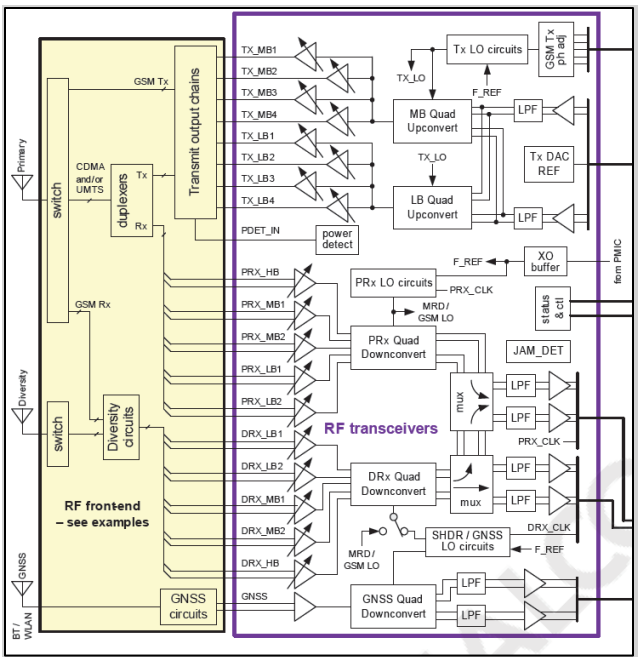
67. Samsung makes, uses, sells, and/or offers to sell in the United States, and/or imports into the United States products that directly infringe the '962 Patent, including the above identified Samsung Accused Products that employ power savings techniques that dynamically adjust bias current and impedance of components in the receiver signal path in response to determined desired and interferer signal strengths in accordance with the '962 Patent claims, including through the techniques employed in transceivers that include IntelliCeiver technology (and variant or successor technologies) (the '962 Accused Products). Based upon an investigation of publicly available materials, the '962 Accused Products include at least the devices identified in Paragraphs 48-65

above, as well as other devices in the same families, and other Samsung products that include transceivers that operate in a manner that is not colorably different from those explicitly listed.

68. The ’962 Accused Products infringe at least claim 1 of the ’962 Patent. Each ’962 Accused Product is a battery powered portable wireless device. Each includes a wireless transceiver necessary for the device to offer cellular calling and/or cellular data capabilities. A transceiver is a device comprising both a transmitter and a receiver. By reducing power dissipation by the transceiver, there is a corresponding reduction in the energy usage and corresponding lengthening of battery life of the Accused Product.

69. The ’962 Accused Products receive wireless signals, including desired signal(s) (i.e., a signal that carries the voice, video, or data of interest), interferer signal(s), and noise. These signals are received by a transceiver via an input from an antenna in the Accused Product.

70. The wireless transceivers in the ’962 Accused Products include at least one signal path comprised of a plurality of circuits, including an amplifier, a filter, and a mixer. By way of example, the Qualcomm MDM6X00 User Guide provides a high-level depiction of a representative signal path that includes such features (e.g., within the RF transceiver signal block):



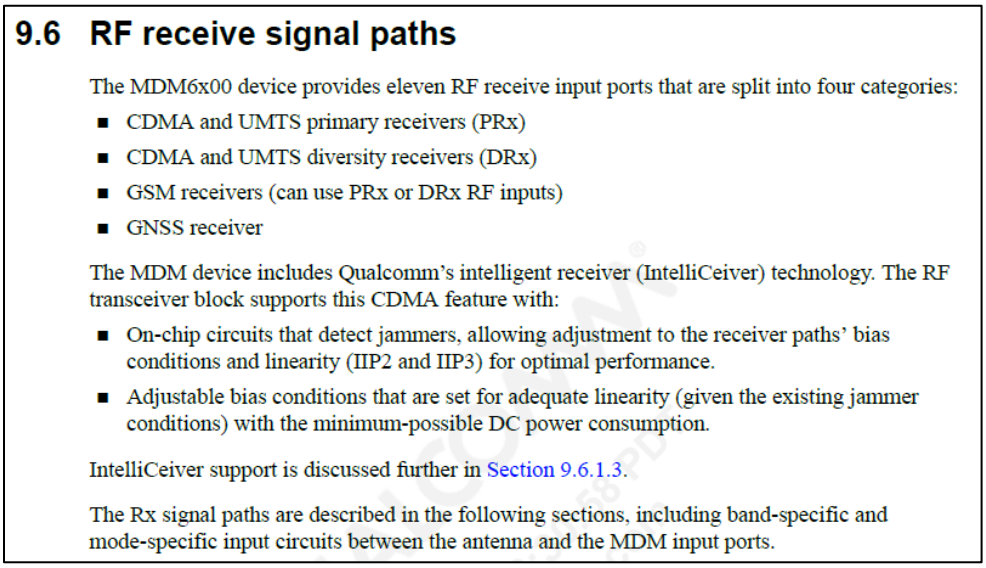
MDM6X00 User Guide at 14 (cropped).

71. The transceiver also includes circuitry for determining the desired signal strength. By way of example, the desired signal strength is displayed in iconic form as the "bar" indicator on each Accused Product and can also be accessed via service screen and administrative functions.

72. The receiver signal path also includes circuitry for determining the signal strength of the interferer signal. The transceiver circuitry includes, for example, the circuitry identified as "JAM_DET," which references the jammer detection circuitry included each '962 Accused Product. "Jammer" refers to an interferer signal or signals. The jammer detection feature in the Accused Products determines the jammer levels in order to optimize power consumption. Based on the determined signal strength, "RF transceivers transition from lower-current to higher-current modes at sufficiently low jammer levels to ensure that even worst-case devices have adequate performance to pass all linearity tests required by the standards." MDM6X00 User Guide at 154.

73. The receivers in the '962 Accused Products achieve a reduction in power dissipation by altering the bias currents and impedances of the components in the signal receive path; these

techniques are the essence of the IntelliCeiver functionality: "The RF transceiver and baseband circuits work together to incorporate IntelliCeiver technology. Jammer detection is just a small part of this innovative technology. Using the reported jammer conditions, the baseband circuits control the RF transceiver's operational status to optimize receiver performance with the minimum possible DC power consumption." MDM6X00 Guide at 154. Qualcomm documentation also states that RF receive signal circuit paths including IntelliCeiver technology utilize the circuitry (including for determining received signal strength and/or interferer signal strength) described above to adjust bias conditions and linearity to optimize performance and power consumption.



9.6 RF receive signal paths

The MDM6x00 device provides eleven RF receive input ports that are split into four categories:

- CDMA and UMTS primary receivers (PRx)
- CDMA and UMTS diversity receivers (DRx)
- GSM receivers (can use PRx or DRx RF inputs)
- GNSS receiver

The MDM device includes Qualcomm's intelligent receiver (IntelliCeiver) technology. The RF transceiver block supports this CDMA feature with:

- On-chip circuits that detect jammers, allowing adjustment to the receiver paths' bias conditions and linearity (IIP2 and IIP3) for optimal performance.
- Adjustable bias conditions that are set for adequate linearity (given the existing jammer conditions) with the minimum-possible DC power consumption.

IntelliCeiver support is discussed further in Section 9.6.1.3.

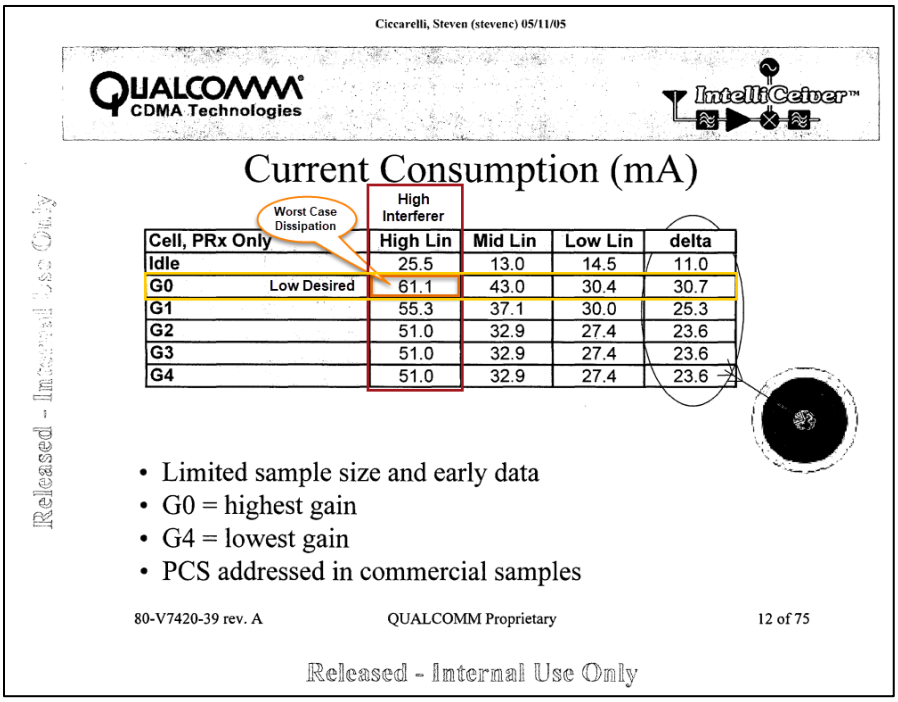
The Rx signal paths are described in the following sections, including band-specific and mode-specific input circuits between the antenna and the MDM input ports.

MDM6X00 Guide at 151.

74. When the signal strength of the desired signal is low and the signal strength of the interferer signal is high, this presents a worst-case scenario in terms of power dissipation. In such case, it is necessary to amplify the received signal to a stage where the desired signal is detectible using a gain stage. Such amplification will also amplify the interferer (jammer) signal necessitating, for example, high bias currents and/or reductions in impedance, each of which has a

negative impact on power consumption that results in an exemplary high "first current drain" to achieve high linearity and high dynamic range.

75. Qualcomm's IntelliCeiver Data Review presentation identifies that the worst-case power condition occurs when the signal strength of the desired signal is low, and the signal strength of the interferer signal is high—where high gain and high linearity conditions are present:



Ciccarelli, Steven (stevenc) 05/11/05

QUALCOMM CDMA Technologies

IntelliCeiver™

Current Consumption (mA)

Worst Case Dissipation

High Interferer

Cell, PRx Only	High Lin	Mid Lin	Low Lin	delta
Idle	25.5	13.0	14.5	11.0
G0 Low Desired	61.1	43.0	30.4	30.7
G1	55.3	37.1	30.0	25.3
G2	51.0	32.9	27.4	23.6
G3	51.0	32.9	27.4	23.6
G4	51.0	32.9	27.4	23.6

- Limited sample size and early data
- G0 = highest gain
- G4 = lowest gain
- PCS addressed in commercial samples

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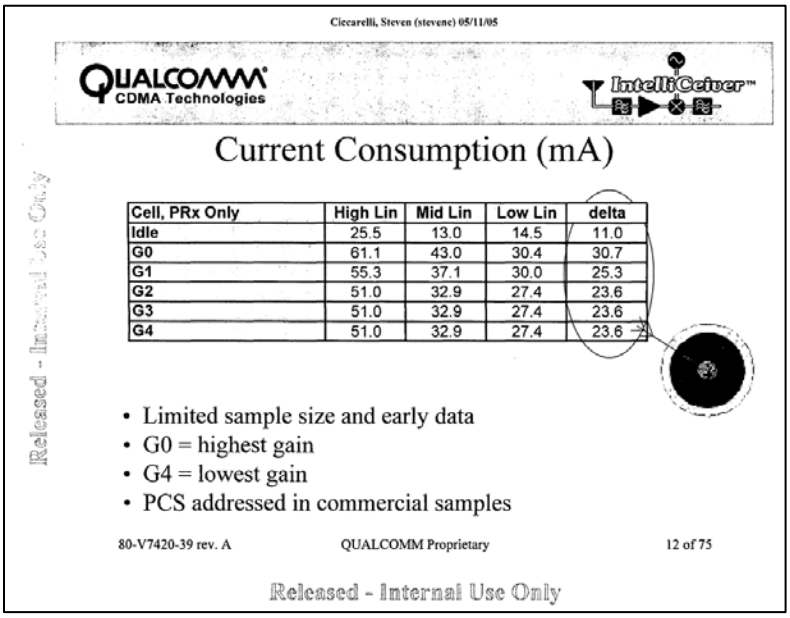
IntelliCeiver Data Review at 12 (colored annotations added). The worst-case power dissipation condition depicted results in a "first current drain."

76. The MDM6X00 Guide explains that high-level jammer signals will cause the transceiver to "quickly switch[] the active Rx path from a lower-current mode to a higher-current mode. The primary receiver is not released from its higher-current mode until an acceptable jammer level is confirmed over a sufficient period of time. When the jammer conditions are not severe, the receiver is allowed to operate in one of its lower-current modes thereby reducing its average DC power dissipation." MDM6X00 Guide at 154.

77. In the ’962 Accused Products, the bias current and impedance of one or more of the plurality of circuits in the receiver signal path is adjusted based upon the determined desired signal strength and interferer signal strength. In the situation where the interferer signal is high and the desired signal is also high, this presents an improvement from the worst-case scenario from a power consumption standpoint.

78. In the ’962 Accused Products, the bias current and impedance of one or more of the plurality of circuits in the receiver signal path is adjusted based upon the determined desired signal strength and interferer signal strength. In the situation were the interferer signal is low, and the desired signal is also low, the bias current and impedance of one or more of the plurality of circuits in the receiver signal path is reduced, resulting in a reduced current drain when compared to the first current drain. Qualcomm’s IntelliCeiver Data Review reports that when the signal strength of the interferer signal is low and the signal strength of the desired signal is low, the linearity condition may be decreased, resulting in a reduction in current drain.



IntelliCeiver Data Review at 12.

79. In the ’962 Accused Products, the bias current and impedance of one or more of the plurality of circuits in the receiver signal path is adjusted based upon the determined desired signal strength and interferer signal strength. In the situation were the signal strength of the interferer signal is low and the signal strength of the desired signal is high, the bias current is decreased and impedance is increased for one or more of the plurality of circuits in the receiver signal path, resulting in a reduced current drain when compared to the first current drain. By way of example, Qualcomm’s IntelliCeiver Data Review reports that when the signal strength of the interferer signal is low and the signal strength of the desired signal is high, the linearity condition may be decreased, and the bias current may also be decreased, resulting in a reduction in current drain when compared with a worst-case scenario.

80. By making, using, offering for sale, and/or selling products in the United States, and/or importing products into the United States, including but not limited to the ’962 Accused Products, Samsung has injured Theta and is liable to Theta for directly infringing one or more claims of the ’962 Patent, including without limitation claim 1 pursuant to 35 U.S.C. § 271(a).

81. Samsung also infringes the ’962 Patent under 35 U.S.C. § 271(b) & (c).

82. Samsung knowingly encourages and intends to induce infringement of the ’962 Patent by making, using, offering for sale, and/or selling products in the United States, and/or importing them into the United States, including but not limited to the ’962 Accused Products, with knowledge and specific intention that such products will be used by its customers, and that such use will necessarily result in infringement of the ’962 Patent.

83. Samsung also contributes to the infringement of the ’962 Patent. Samsung makes, uses, sells, and/or offers to sell products in the United States, and/or imports them into the United States, including but not limited to the ’962 Accused Products, knowing that those products

constitute a material part of the claimed invention, that they are especially made or adapted for use in infringing the ’962 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use.

84. On information and belief, Samsung was aware of the ’962 Patent and related Theta patents, had knowledge of the infringing nature of its activities, and nevertheless continues its infringing activities. For example, on May 18, 2016, Theta sued Samsung for infringement of two parent patents of the ’962 Patent. *See Theta IP v. Samsung Elecs. Co. Ltd. et al*., No. 2:16-cv-00527-JRG-RSP (E.D. Tex. May 18, 2016), Dkt. 1. The application for the ’962 Patent published on July 21, 2016.

85. On information and belief, Samsung was also aware of the ’962 Patent because the ’962 Patent’s parent was cited as prior art during the prosecution of a patent applications filed by Samsung in the Korean Patent Office (Application No. KR20130138416 20131114, issued as KR20150055878) and the United States Patent Office (U.S. Application No. 14/523,982, issued as U.S. Patent No. 9,819,322).

86. On information and belief, Samsung was aware of the issued claims and that Samsung’s Infringing Products infringed one or more of the issued claims. Thus, Samsung had a specific reason to know of the ’962 Patent and to believe that it infringed one or more of its claims.

87. Samsung’s infringement of the ’962 Patent has been and continues to be deliberate and willful, and, this is therefore an exceptional case warranting an award of enhanced damages and attorneys’ fees pursuant to 35 U.S.C. §§ 284-285.

88. As a result of Samsung’s infringement of the ’962 Patent, Theta has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Samsung’s infringement, but in no event less than a reasonable royalty with interest and costs.

SECOND COUNT

(INFRINGEMENT OF U.S. PATENT NO. 10,129,825)

89. Theta incorporates by reference the allegations set forth in paragraphs 1-88 as though fully set forth herein.

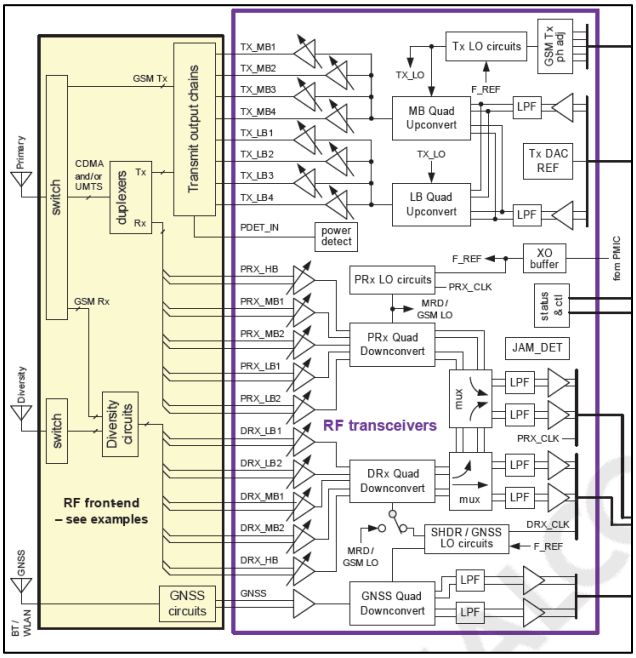
90. Samsung makes, uses, sells, and/or offers to sell in the United States, and/or imports into the United States products that directly infringe the '825 Patent, including the above identified Samsung Accused Products that employ power savings techniques that dynamically adjust bias current and/or impedance of components in the receiver signal path in response to determined desired and interferer signal strengths in accordance with the '825 Patent claims, including through the techniques employed in transceivers that include IntelliCeiver technology (and variant or successor technologies) (the '825 Accused Products). Based upon an investigation of publicly available materials, the '825 Accused Products include at least the devices identified in Paragraphs 48-65 above, as well as other devices in the same families, and other Samsung products that include transceivers that operate in a manner that is not colorably different from those explicitly listed.

91. The '825 Accused Products infringe at least claim 1 of the '825 Patent. Each '825 Accused Product is a battery powered portable wireless device. Each includes a wireless transceiver necessary for the device to offer cellular calling and/or cellular data capabilities. A transceiver is a device comprising both a transmitter and a receiver.

92. The '825 Accused Products receive wireless signals, including both a desired signal(s) (i.e., a signal that carries the voice or data of interest) and interferer signal(s). These signals are received by a transceiver via an input from an antenna in the Accused Product.

93. The wireless transceivers in the '825 Accused Products include at least one signal path comprised of a plurality of circuits, including an amplifier, a filter, and a mixer. By way of

example, the Qualcomm MDM6X00 User Guide provides a high-level depiction of a representative signal path that includes such features (e.g., within the RF transceiver signal blocks):



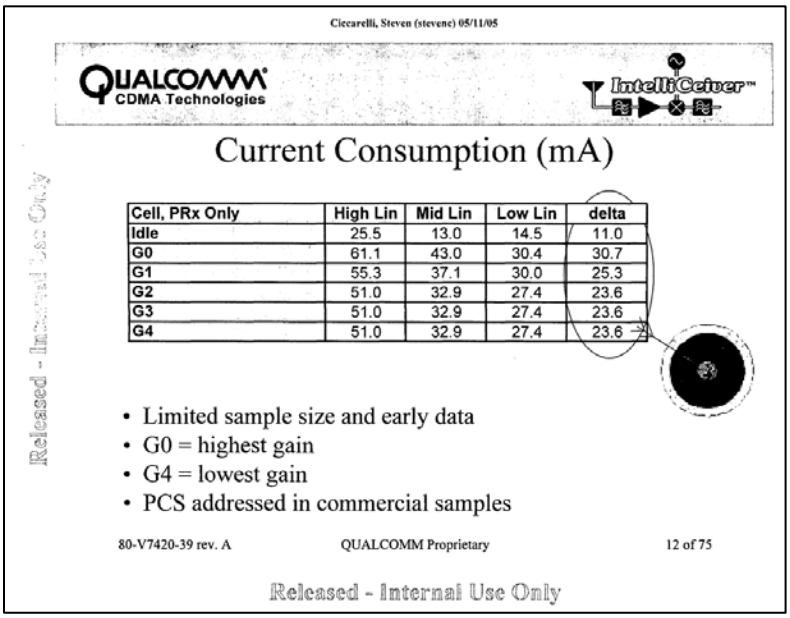
MDM6X00 User Guide at 14 (cropped).

94. The transceiver also includes circuitry for determining the desired signal strength. By way of example, the desired signal strength is displayed in iconic form as the "bar" indicator on each Accused Product and can also be accessed via service screen and administrative functions.

95. The receiver signal path also includes circuitry for determining the signal strength of the interferer signal. The transceiver circuitry includes, for example, the circuitry identified as "JAM_DET," which references the jammer detection circuitry included each '825 Accused Product. "Jammer" refers to an interferer signal or signals. The jammer detection feature in the Accused Products determines the jammer levels in order to optimize power consumption. Based on the determined signal strength, "RF transceivers transition from lower-current to higher-current modes at sufficiently low jammer levels to ensure that even worst-case devices have adequate performance to pass all linearity tests required by the standards." MDM6X00 User Guide at 154.

96. Consistent with exemplary claim 1 of the ’825 Patent, the worst-case power dissipation condition occurs when the signal strength of the desired signal is low, and the signal strength of the interferer signal is high. In such case in the ’825 Accused Products, it is necessary to amplify the received signal to a stage where the desired signal is detectible using a gain stage. Such amplification will also amplify the interferer (jammer) signal necessitating, for example, high bias currents to achieve high linearity and high dynamic range.

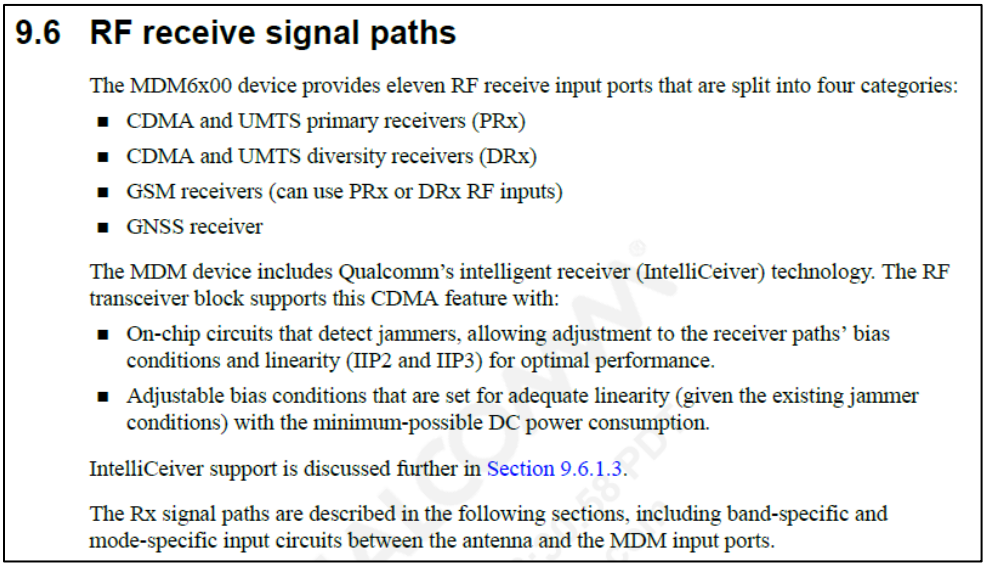
97. Qualcomm’s IntelliCeiver Data Review presentation identifies that the worst-case power condition occurs when the signal strength of the desired signal is low, and the signal strength of the interferer signal is high—where high gain and high linearity conditions are present:



IntelliCeiver Data Review at 12. The MDM6X00 Guide explains that high-level jammer signals will cause the transceiver to “quickly switch[] the active Rx path from a lower-current mode to a higher-current mode. The primary receiver is not released from its higher-current mode until an acceptable jammer level is confirmed over a sufficient period of time. When the jammer conditions are not severe, the receiver is allowed to operate in one of its lower-current modes thereby reducing its average DC power dissipation.” MDM6X00 Guide at 154.

98. The receivers in the ’825 Accused Products achieve a reduction in power dissipation by altering the bias currents and/or impedances of the components in the signal receive path; these techniques are the essence of the IntelliCeiver functionality: “The RF transceiver and baseband circuits work together to incorporate IntelliCeiver technology. Jammer detection is just a small part of this innovative technology. Using the reported jammer conditions, the baseband circuits control the RF transceiver’s operational status to optimize receiver performance with the minimum possible DC power consumption.” MDM6X00 Guide at 154.

99. Exemplary Qualcomm documentation explains that the adjustments to bias and linearity (which may include impedance) are made in response to the operational parameters, including the levels of the interferer signal, to optimize power dissipation:



9.6 RF receive signal paths

The MDM6x00 device provides eleven RF receive input ports that are split into four categories:

- CDMA and UMTS primary receivers (PRx)
- CDMA and UMTS diversity receivers (DRx)
- GSM receivers (can use PRx or DRx RF inputs)
- GNSS receiver

The MDM device includes Qualcomm’s intelligent receiver (IntelliCeiver) technology. The RF transceiver block supports this CDMA feature with:

- On-chip circuits that detect jammers, allowing adjustment to the receiver paths’ bias conditions and linearity (IIP2 and IIP3) for optimal performance.
- Adjustable bias conditions that are set for adequate linearity (given the existing jammer conditions) with the minimum-possible DC power consumption.

IntelliCeiver support is discussed further in Section 9.6.1.3.

The Rx signal paths are described in the following sections, including band-specific and mode-specific input circuits between the antenna and the MDM input ports.

MDM6X00 Guide at 151.

100. In the ’825 Accused Products, the bias current of one or more of the plurality of circuits in the receiver signal path is adjusted based upon the determined desired signal strength and interferer signal strength. Qualcomm’s IntelliCeiver Data Review reports that when the interferer signal is high and the signal strength of the desired signal is low, and the desired signal is larger

than in the worst-case power dissipation condition, the bias current of one or more of the circuits in the receiver signal path of the wireless transceiver are reduced compared to the worst-case power dissipation condition, thereby saving power (e.g., the gain is changed from the G0 state to the G1 state).

101. In the ’825 Accused Products, the bias current of one or more of the plurality of circuits in the receiver signal path is adjusted based upon the determined desired signal strength and interferer signal strength. Qualcomm’s IntelliCeiver Data Review reports that when the signal strength of the interferer signal is weak and the signal strength of the desired signal is weak, the bias current of one or more of the plurality of circuits in the receiver signal path is decreased compared to the worst-case power dissipation condition, thereby saving power (i.e., the linearity state transitions from high to low).

102. By making, using, offering for sale, and/or selling products in the United States, and/or importing products into the United States, including but not limited to the ’825 Accused Products, Samsung has injured Theta and is liable to Theta for directly infringing one or more claims of the ’825 Patent, including without limitation claim 1 pursuant to 35 U.S.C. § 271(a).

103. Samsung also infringes the ’825 Patent under 35 U.S.C. § 271(b) & (c).

104. Samsung knowingly encourages and intends to induce infringement of the ’825 Patent by making, using, offering for sale, and/or selling products in the United States, and/or importing them into the United States, including but not limited to the ’825 Accused Products, with knowledge and specific intention that such products will be used by its customers, and that such use will necessarily result in infringement of the ’825 Patent.

105. Samsung also contributes to the infringement of the ’825 Patent. Samsung makes, uses, sells, and/or offers to sell products in the United States, and/or imports them into the United

States, including but not limited to the ’825 Accused Products, knowing that those products constitute a material part of the claimed invention, that they are especially made or adapted for use in infringing the ’825 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use.

106. On information and belief, Samsung was aware of the ’825 Patent and related Theta patents, had knowledge of the infringing nature of its activities, and nevertheless continues its infringing activities. For example, on May 18, 2016, Theta sued Samsung for infringement of two parent patents of the ’825 Patent. *See Theta IP v. Samsung Elecs. Co. Ltd. et al*., No. 2:16-cv-00527-JRG-RSP (E.D. Tex. May 18, 2016), Dkt. 1. The application for the ’825 Patent published on July 21, 2016.

107. On information and belief, Samsung was also aware of the ’825 Patent because the ’825 Patent’s parent was cited as prior art during the prosecution of a patent applications filed by Samsung in the Korean Patent Office (Application No. KR20130138416 20131114, issued as KR20150055878), and in the United States Patent Office (U.S. Application No. 14/523,982, issued as U.S. Patent No. 9,819,322).

108. On information and belief, Samsung was aware of the issued claims and that Samsung’s Infringing Products infringed one or more of the issued claims. Thus, Samsung had a specific reason to know of the ’825 Patent and to believe that it infringed one or more of its claims.

109. Samsung’s infringement of the ’825 Patent has been and continues to be deliberate and willful, and, this is therefore an exceptional case warranting an award of enhanced damages and attorneys’ fees pursuant to 35 U.S.C. §§ 284-285.

110. As a result of Samsung's infringement of the '835 Patent, Theta has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Samsung's infringement, but in no event less than a reasonable royalty with interest and costs.

THIRD COUNT

(INFRINGEMENT OF U.S. PATENT NO. 10,524,202)

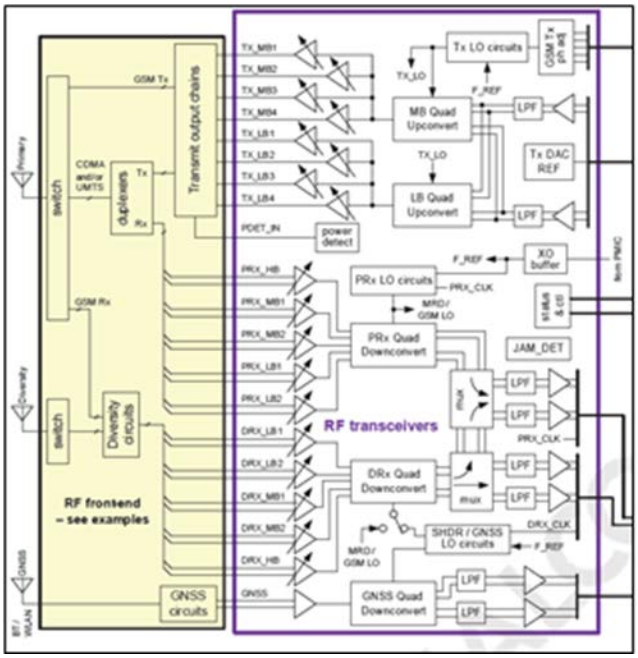
111. Theta incorporates by reference the allegations set forth in paragraphs 1-110 as though fully set forth herein.

112. Samsung makes, uses, sells, and/or offers to sell in the United States, and/or imports into the United States products that directly infringe the '202 Patent, including the above identified Samsung Accused Products that employ power savings techniques that dynamically adjust bias current, gain and impedance of components in the receiver signal path in response to determined desired and interferer signal strengths in accordance with the '202 Patent claims, including through the techniques employed in transceivers that include IntelliCeiver technology (and variant or successor technologies) (the '202 Accused Products). Based upon an investigation of publicly available materials, the '202 Accused Products include at least the devices identified in Paragraphs 48-65 above, as well as other devices in the same families, and other Samsung products that include transceivers that operate in a manner that is not colorably different from those explicitly listed.

113. The '202 Accused Products infringe at least claim 2 (and claim 1 from which it depends) of the '202 Patent. Each '202 Accused Product is a battery powered portable wireless device. Each includes a wireless transceiver necessary for the device to offer cellular calling and/or cellular data capabilities. A transceiver is a device comprising both a transmitter and a receiver. By reducing power dissipation by the transceiver, there is a corresponding improvement in battery life of the Accused Products.

114. The ’202 Accused Products receive wireless signals, including both a desired signal(s) (i.e., a signal that carries the voice or data of interest) and interferer signal(s). These signals are received by a transceiver via an input from an antenna in the Accused Product.

115. The wireless transceivers in the ’202 Accused Products include at least one signal path comprised of a plurality of circuits, including an amplifier, a filter, and a mixer. By way of example, the Qualcomm MDM6X00 User Guide provides a high-level depiction of a representative signal path that includes such features (e.g., within the RF transceiver signal block):



MDM6X00 User Guide at 14 (cropped).

116. The transceiver also includes circuitry for determining the desired signal strength. By way of example, the desired signal strength is displayed in iconic form as the “bar” indicator on each Accused Product and can also be accessed via service screen and administrative functions.

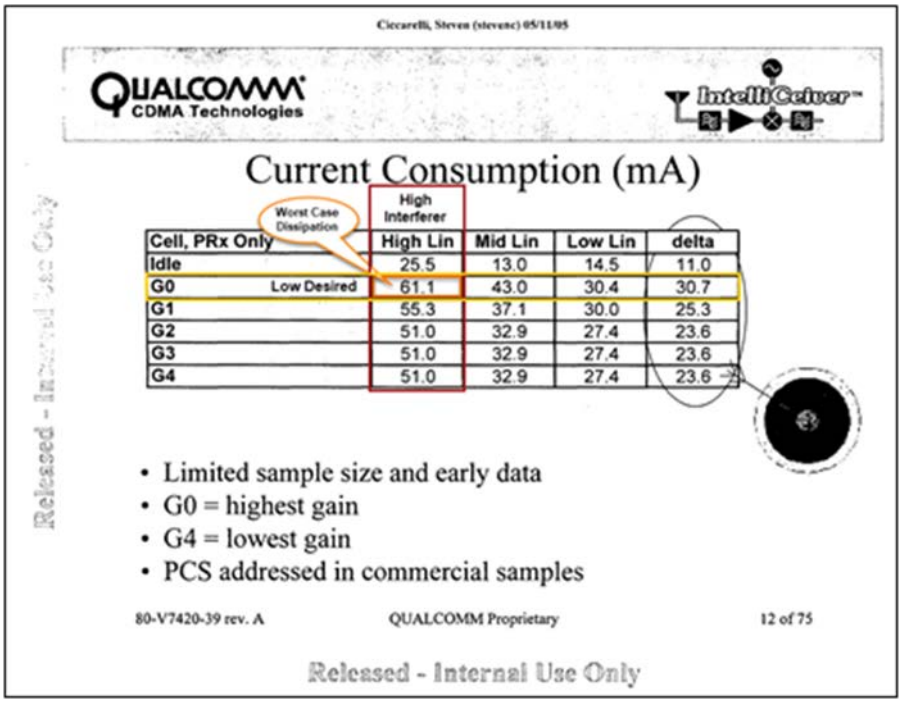
117. The receiver signal path also includes circuitry for determining the signal strength of the interferer signal. The transceiver circuitry includes, for example, at least the circuitry identified as “JAM_DET,” which references the jammer detection circuitry included each ’202 Accused

Product. "Jammer" refers to an interferer signal or signals. The determined signals are compared so as to determine the appropriate operating parameters for the given conditions in order to optimize power consumption by adjusting the gain, impedance, or bias of at least an amplifier, filter, or mixer in the receiver signal path. By way of example, "RF transceivers transition from lower-current to higher-current modes at sufficiently low jammer levels to ensure that even worst-case devices have adequate performance to pass all linearity tests required by the standards." MDM6X00 User Guide at 154.

118. Consistent with exemplary claim 2, a worst-case scenario in terms of power dissipation occurs in a situation where the signal strength of the desired signal is low and the signal strength of the interferer signal is high. In such case in the '202 Accused Products, it is necessary to amplify the received signal to a stage where the desired signal is detectible using a gain stage. Such amplification will also amplify the interferer (jammer) signal necessitating, for example, high bias currents and/or reductions in impedance to achieve high linearity and high dynamic range.

119. Consistent with exemplary claim 2, a best-case power dissipation condition occurs when the signal strength of the desired signal is high, and the signal strength of the interferer is low.

120. Qualcomm's IntelliCeiver Data Review presentation identifies that the worst-case power condition occurs when the signal strength of the desired signal is low, and the signal strength of the interferer signal is high—where high gain and high linearity conditions are present:



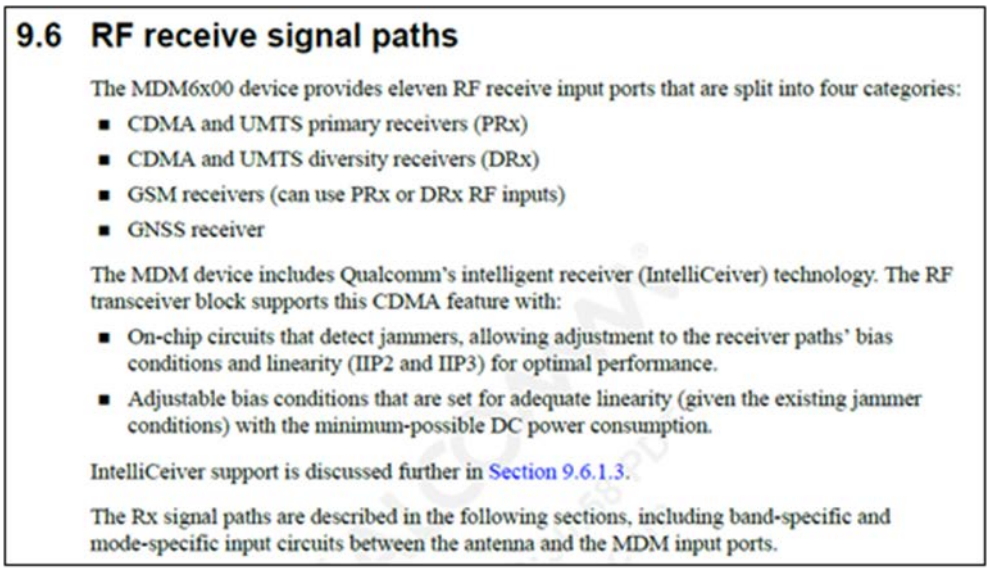
IntelliCeiver Data Review at 12 (colored annotations added). Operation is shown between exemplary worst-case and best-case power dissipation conditions.

121. The MDM6X00 Guide articulates altering bias current as interferer signals decrease over time in explaining that high-level jammer signals will cause the transceiver to "quickly switch[] the active Rx path from a lower-current mode to a higher-current mode. The primary receiver is not released from its higher-current mode until an acceptable jammer level is confirmed over a sufficient period of time. When the jammer conditions are not severe, the receiver is allowed to operate in one of its lower-current modes thereby reducing its average DC power dissipation." MDM6X00 Guide at 154. Thus, as the interferer signal decreases over time the bias current of one or more components in the signal path is dynamically decreased, consistent with claim 2.

122. The receivers in the '202 Accused Products achieve a reduction in power dissipation by altering the bias currents and/or impedances of the components in the signal receive path; these techniques critical to achieving the purported benefits of the IntelliCeiver functionality: "The RF transceiver and baseband circuits work together to incorporate IntelliCeiver technology. Jammer

detection is just a small part of this innovative technology. Using the reported jammer conditions, the baseband circuits control the RF transceiver's operational status to optimize receiver performance with the minimum possible DC power consumption." MDM6X00 Guide at 154.

123. Exemplary Qualcomm documentation explains that the adjustments to bias and linearity (which, may include impedance) are made in response to the operational parameters, including the levels of the interferer signal, to optimize power dissipation:



9.6 RF receive signal paths

The MDM6x00 device provides eleven RF receive input ports that are split into four categories:

- CDMA and UMTS primary receivers (PRx)
- CDMA and UMTS diversity receivers (DRx)
- GSM receivers (can use PRx or DRx RF inputs)
- GNSS receiver

The MDM device includes Qualcomm's intelligent receiver (IntelliCeiver) technology. The RF transceiver block supports this CDMA feature with:

- On-chip circuits that detect jammers, allowing adjustment to the receiver paths' bias conditions and linearity (IIP2 and IIP3) for optimal performance.
- Adjustable bias conditions that are set for adequate linearity (given the existing jammer conditions) with the minimum-possible DC power consumption.

IntelliCeiver support is discussed further in Section 9.6.1.3.

The Rx signal paths are described in the following sections, including band-specific and mode-specific input circuits between the antenna and the MDM input ports.

MDM6X00 Guide at 151.

124. In the '202 Accused Products, the bias current of one or more of the plurality of circuits in the receiver signal path is adjusted based upon the determined desired signal strength and variable interferer signal strengths. Qualcomm's IntelliCeiver Data Review reports that when interferer signal is high and the signal strength of the desired signal is low, the bias current of one or more of the circuits in the receiver signal path of the wireless transceiver are reduced, thereby saving power (e.g., the gain is changed from the G0 state to the G1 state). Qualcomm's IntelliCeiver Data Review also reports that when the signal strength of the interferer signal is weak and the signal strength of the desired signal is weak, the bias current of one or more of the plurality

of circuits in the receiver signal path is decreased, thereby saving power (i.e., the linearity state transitions from high to low).

125. By making, using, offering for sale, and/or selling products in the United States, and/or importing products into the United States, including but not limited to the '202 Accused Products, Samsung has injured Theta and is liable to Theta for directly infringing one or more claims of the '202 Patent, including without limitation claim 2 pursuant to 35 U.S.C. § 271(a).

126. Samsung also infringes the '202 Patent under 35 U.S.C. § 271(b) & (c).

127. Samsung knowingly encourages and intends to induce infringement of the '202 Patent by making, using, offering for sale, and/or selling products in the United States, and/or importing them into the United States, including but not limited to the '202 Accused Products, with knowledge and specific intention that such products will be used by its customers, and that such use will necessarily result in infringement of the '202 Patent.

128. Samsung also contributes to the infringement of the '202 Patent. Samsung makes, uses, sells, and/or offers to sell products in the United States, and/or imports them into the United States, including but not limited to the '202 Accused Products, knowing that those products constitute a material part of the claimed invention, that they are especially made or adapted for use in infringing the '202 Patent, and that they are not staple articles or commodities of commerce capable of substantial non-infringing use. On information and belief, Samsung was aware of the '202 Patent and related Theta patents, had knowledge of the infringing nature of its activities, and nevertheless continues its infringing activities. For example, on May 18, 2016, Theta sued Samsung for infringement of two (grand)parent patents of the '202 Patent. S*ee Theta IP v. Samsung Elecs. Co. Ltd. et al*., No. 2:16-cv-00527-JRG-RSP (E.D. Tex. May 18, 2016), Dkt. 1. In

addition, Samsung became aware of the specific application of claims of the ’202 patent to its products at least as of this Complaint.

129. On information and belief, Samsung was also aware of the ’202 Patent because the ’202 Patent’s (grand)parent was cited as prior art during the prosecution of a patent applications filed by Samsung in the Korean Patent Office (Application No. KR20130138416 20131114, issued as KR20150055878) and the United States Patent Office (U.S. Application No. 14/523,982, issued as U.S. Patent No. 9,819,322.

130. On information and belief, Samsung was aware of the issued claims and that Samsung’s Infringing Products infringed one or more of the issued claims. Thus, Samsung had a specific reason to know of the ’202 Patent and to believe that it infringed one or more of its claims.

131. Samsung’s infringement of the ’202 Patent has been and continues to be deliberate and willful, and, this is therefore an exceptional case warranting an award of enhanced damages and attorneys’ fees pursuant to 35 U.S.C. §§ 284-285.

132. As a result of Samsung’s infringement of the ’202 Patent, Theta has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Samsung’s infringement, but in no event less than a reasonable royalty with interest and costs.

PRAYER FOR RELIEF

WHEREFORE, Theta prays for judgment and seeks relief against Samsung as follows:

A. For judgment that Samsung has infringed and/or continues to infringe one or more claims of the Patents in Suit, directly, and/or indirectly by way of inducement or contributory infringement;

B. For a preliminary and permanent injunction against Samsung, its respective officers, agents, servants, employees, attorneys, parent and subsidiary corporations, assigns

and successors in interest, and those persons in active concert or participation with them, enjoining them from infringement, inducement of infringement, and contributory infringement of the Patents in Suit, including but not limited to an injunction against making, using, selling, and/or offering for sale within the United States, and importing into the United States, any products and/or services that infringe the Patents in Suit;

C. For judgment awarding Theta damages adequate to compensate it for Samsung's infringement of the Patents in Suit, including all pre-judgment and post-judgment interest;

D. For judgment that Samsung has willfully infringed and continues to willfully infringe one or more claims of the patent-in-suit;

E. For judgment that Samsung has infringed in bad faith and continues to infringe one or more claims of the patent-in-suit in bad faith;

F. For judgment awarding enhanced damages pursuant to 35 U.S.C. § 284;

G. For judgment imposing a mandatory future royalty payable on each and every product or service sold by Samsung in the future that is found to infringe the patent-in-suit and on all future products and services which are not colorably different from products found to infringe;

H. For judgment awarding attorneys' fees pursuant to 35 U.S.C. § 285 or otherwise permitted by law;

I. For judgment awarding costs of suit; and

J. For judgment awarding Theta such other and further relief as the Court may deem just and proper.

DEMAND FOR JURY TRIAL

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, Theta hereby demands a trial by jury of this action.

Respectfully submitted,

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